Letter to the Editor on "Effects of Antigravity Treadmill Training on Gait, Balance, and Fall Risk in Children With Diplegic Cerebral Palsy"

Ammann-Reiffer, Corinne ; Labruyère, Rob

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Letter to the Editor on "Effects of Antigravity Treadmill Training on Gait, Balance, and Fall Risk in Children With Diplegic Cerebral Palsy"

To the Editor:

With great interest, we read the article of Dr El-Shamy entitled "Effects of Antigravity Treadmill Training on Gait, Balance, and Fall Risk in Children With Diplegic Cerebral Palsy,"[1] and we would like to commend him and his team on performing such a laborious trial incorporating 30 children with cerebral palsy (CP).

In this randomized clinical trial over 3 months, the author showed that a body-weight supported treadmill training (BWSTT) of 20 minutes added to 1 hour of conventional physiotherapy per session for around 36 sessions led to significant and impressive improvements in several gait-related outcome measures compared with physiotherapy alone in children with mild CP. The total dosage of intervention was approximately 48 hrs for the intervention group compared with 36 hrs for the control group. Although these results are highly admirable and desirable, they are in a certain contrast to our clinical experience as well as the existing evidence on BWSTT in children with CP.

In 2010, an overview of systematic reviews investigating BWSTT in children with motor impairments concluded that there was still insufficient evidence to confidently conclude that BWSTT has positive effects on walking in children with CP.[2] A more recent systematic review by Moreau et al. summarized that BWSTT seemed to show lower effect sizes in increasing overground walking speed compared with treadmill training without BWS in children with CP; however, a direct comparison between both groups was not possible.[3] Moreover, a recent clinical trial showed that BWSTT was no more effective than overground walking at improving aspects of walking and function in children with mild to moderate CP.[4]

Regarding postural control, a systematic review by Dewar et al. classified existing evidence of BWSTT as "weak or conflicting."[5]

Thus, even though the training form of BWSTT is in line with the current concepts of motor control and motor learning (task-specific approach, high dosage of repetitions), existing studies failed so far to show a clear superiority of this intervention with a relatively low dosage of add-on therapy.

So, what could be the possible explanations for the surprisingly positive results of the intervention group in the study of El-Shamy?

- *The author did not compare change scores to establish differences between groups but rather compared beginning and end values.*
  In our opinion, this is a statistical flaw and might have influenced the results.
- *The quality of the conventional therapy was not high enough to produce significant effects.*
  However, the improvements that have also occurred in the conventional group seem to disallow this conclusion.
- *The participating children might not have gotten any therapy at all standardly,* thus allowing for disproportionally high progress.
- *The small sample size could have led to an overemphasis of single "responders"* (individuals that show an above-average[6] response to the intervention). Whether this is the case, it cannot be told from the data, especially, because several indicators of data spread seem unreliable (e.g., the standard deviation of gait speed changes from 0.29 to 0.01 from pre to post in the experimental group, see Table 2 of the original paper).[1]
- *The chosen outcome measures are mostly related to walking speed.* Consequently, an increase in walking speed induces inherently an improvement in all other outcomes. Unfortunately, the author only concentrated on these spatiotemporal aspects and did not present any kinematic parameters of his participants.

Because this is the first study that systematically applies the AlterG in a controlled fashion in children with CP, some information on its feasibility in this patient sample would have been helpful:

- A specification of training parameters would have been of help for other users. From the sparse information given, it seems that the children trained for 3 mos at the same rather low speed (75% of their comfortable speed). However, it is known from the literature that treadmill belt speed should be gradually increased over the course of the intervention to increase overground walking speed.[7]
- According to Figure 1, there were no dropouts. This is admirable, given the fact that children and presumably their parents had to visit the clinic three times a week for 3 mos. Unfortunately, the author did not provide any information about how many trainings each participant attended (and missed), nor do we know whether and which adverse events had occurred because of the BWSTT on the AlterG.
- Finally, children with Gross Motor Function Classification System (GMFCS) level I are usually well able to walk and run overground, and evidence suggests that children who are more severely affected may benefit the most from treadmill training interventions.[7] What was the author's rationale for including children with GMFCS level I in such a training regime? Moreover, was it unsatisfying for the therapists that they could not guide the legs in children with GMFCS level II because of the inflatable bag?

A provision of more information in the direction of previously mentioned comments would help clinicians and other research groups and give a better insight into the opportunities and risks of this novel treatment option in this patient population. Furthermore, it might assist in understanding the surprising results of this study a bit better.

Further studies are needed to investigate the differences between a lower body positive pressure-based and a harness-based bodyweight supported system and their influence on the outcome.

Corinne Ammann-Reiffer, MPTSc
Rehabilitation Center for Children
and Adolescents
University Children's Hospital Zurich
Affoltern am Albis, Switzerland
Children's Research Center
University Children's Hospital
Zurich, Switzerland
and CAPHRI Research Institute
Program Functioning and Rehabilitation
Department of Epidemiology
Maastricht University
Maastricht, the Netherlands

Rob Labruyère, PhD
Rehabilitation Center for Children
and Adolescents
University Children's Hospital Zurich
Affoltern am Albis
Switzerland
and Children's Research Center
University Children's Hospital
Zurich, Switzerland

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